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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF	:
VOLKER HENNIGE, ET AL.	: EXAMINER: RHEE, J. J.
SERIAL NO: 10/524,665	:
FILED: FEBRUARY 11, 2005	: GROUP ART UNIT: 1795
FOR: SEPARATOR-ELECTRODE UNIT FOR LITHIUM-ION BATTERIES, METHOD FOR THE PRODUCTION AND USE THEREOF IN LITHIUM BATTERIES	:

APPEAL BRIEF

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

This is an appeal of the Final Rejection dated April 14, 2008 of Claims 1-12 and 30-31. A Notice of Appeal is **submitted herewith**.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Creavis Gesellschaft fuer Tech. und Innovation, having an address at Paul-Baumann-Strasse 1, Marl, Germany, 45722.

II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants' legal representative and the assignee are aware of no appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF THE CLAIMS

Claims 1-12 and 30-31 stand rejected and are herein appealed. Claims 13-28 stand withdrawn from consideration. Claim 29 has been canceled.

IV. STATUS OF THE AMENDMENTS

No amendment under 37 CFR 1.116 has been filed.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

A summary of the claimed subject matter, as claimed in independent Claim 1, is mapped out below, with reference to page and line numbers in the specification added in **[bold]** after each element.

A separator-electrode unit **[4:8-9]** capable of functioning in a lithium battery as a separator-electrode unit **[4:28-30]**, the unit comprising a porous electrode and a separator layer applied to said porous electrode, **[4:9-12]** wherein the separator-electrode unit comprises an inorganic separator layer which comprises at least two fractions of metal oxide particles which differ from each other in their average particle size and/or in the metal, **[4:12-16]** the separator layer comprising metal oxide particles having an average particle size (D_g) which is greater than the average pore size (d) of the pores of the porous electrode that are adhered together by metal oxide particles having an average particle size (D_k) which is smaller than the pores of the porous electrode. **[10:5-11]**

VI. GROUNDS OF REJECTION

Claims 1-12, 30 and 31 stand rejected under 35 U.S.C. § 103(a) as unpatentable over US 6,287,720 (Yamashita et al) in view of US 6,299,778 (Penth et al).

VII. ARGUMENT

Claims 1-12, 30 and 31 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Yamashita et al in view of Penth et al. The rejection is untenable and should not be sustained.

As recited in Claim 1, an embodiment of the present invention is a separator-electrode unit capable of functioning in a lithium battery as a separator-electrode unit, the unit comprising a porous electrode and a separator layer applied to said porous electrode, wherein the separator-electrode unit comprises an inorganic separator layer which comprises at least two fractions of metal oxide particles which differ from each other in their average particle size and/or in the metal, the separator layer comprising metal oxide particles having an average particle size (D_g) which is greater than the average pore size (d) of the pores of the porous electrode that are adhered together by metal oxide particles having an average particle size (D_k) which is smaller than the pores of the porous electrode.

The claims thus requires that the claimed separator-electrode unit be capable of functioning as a separator-electrode unit in a lithium battery; it necessarily follows that the terms "separator layer" and "electrode" are functional limitations of the claims.

Yamashita et al discloses a nonaqueous battery having a porous separator and a production method thereof (Abstract). The Examiner finds that the separator electrode unit of Yamashita et al comprises an inorganic separator layer, relying on the disclosure at column 6, line 59.

In reply, this disclosure is of the insulating substance of Yamashita et al's separator, which may be either an inorganic substance or an organic substance (column 6, lines 58-59). The battery of Yamashita et al requires an organic binder in the separator thereof (column 7, lines 56-65 and the Examples). While this disclosure states that it is "preferred" that the

separator further comprise a binder in order to bind the particles together, no other means is disclosed in Yamashita et al for such binding.

Penth et al is drawn to a catalytically active permeable composite material, method for producing the composite material, and use of the composite material. The composite material of Penth et al comprises a porous, permeable support or carrier in which a particular inorganic component is applied on at least one side of the support or carrier and inside the support or the carrier (column 2, lines 8-15).

While Penth et al discloses a number of utilities for their catalytically active-permeable composite material, use in a lithium battery is neither disclosed nor suggested. Indeed, the only disclosure of an anode or a cathode is that the composite of Penth et al can be used as a catalyst carrier, whereby the catalyst carrier has an electric field connected to it and the catalyst carrier is connected as an anode or cathode (column 11, lines 13-17). Clearly, Penth et al does not disclose the types of materials that would be used for electrodes in lithium batteries, such as disclosed in the specification herein at page 12, line 3 through page 13, line 16.

In the Final Rejection, in response to Applicants' argument that one skilled in the art would not look to the battery art to solve any problem associated with Penth et al, the Examiner finds that Penth et al "teaches components of a battery such as cathode, anode and separator," relying on the disclosure at column 11, lines 26-29 and column 1, line 22, and concludes that one of ordinary skill in the art "would associate theses [sic] components with a battery. Especially since Penth et al. teaches that by connecting the composite as a cathode, the catalytically reductive effect of the composite can be used and by connecting the composite as an anode the catalytically oxidative effect of the composite can be used."

In reply, the fact that the words cathode and anode are mentioned in Penth et al is irrelevant. The Examiner ignores the context in which these terms are used, as discussed

above. Indeed, the term "catalytic" appears throughout Penth et al's disclosure, emphasizing the fact that the composite material of Penth et al is directed to carrying out processes in which the catalytic activity of the composite material is implicated. There is neither disclosure nor suggestion that the catalytically active composite materials of Penth et al would have any utility in combination with an electrode to form a separator-electrode unit capable of functioning in a lithium battery as a separator-electrode unit.

In response to Applicants' argument that since Yamashita et al requires an organic binder in the separator, one skilled in the art would not have combined Yamashita et al and Penth et al, the Examiner finds that Yamashita et al "teaches a separator comprising inorganic particles and a binder in the amount of 1/500 to 5/3, therefore can be defined as an inorganic separator because the separator can consist of mostly inorganic particles and because the applicant claimed that the inorganic separator *comprises* at least two fractions of metal oxide particles that differ from each other in particle size or in the metal which is not limited to consisting only metal oxide particles."

In reply, that Applicants employ the term "comprises" in the claims, meaning that the separator-electrode unit can include other components, does not negate the fact that Claim 1 recites that the separator-electrode unit comprise "an inorganic separator layer." The term "an inorganic separator layer" necessarily excludes the presence of organic materials. The ratio range of inorganic particles to binder in Yamashita et al (paragraph bridging columns 7 and 8) does not change this fact, even though in terms of volume ratio, the particles may have a volume ratio to binder of 500/1.

Claims 7-9

Claims 7-9 are separately patentable. These claims require that the separator layer comprise a coating with shutdown particles which melt at a desired shutdown temperature.

Yamashita et al discloses and suggests nothing with regard to a coating as part of their separator layer, let alone a coating with particles having the capability of performing a shutdown function. The Examiner's citations refer to the particles of the insulating substance of Yamashita et al, and not a separate coating.

Claim 11

Claim 11 is separately patentable. The catalytically active permeable composite material of Penth et al is disclosed as obtainable from a wide variety of particular materials and amounts thereof. There is no reason to conclude that regardless of the particular materials and amounts used that the resulting composite material would be bendable down to a radius of 50 cm without damage.

For all the above reasons, it is respectfully requested that this rejection be REVERSED.

VIII. CONCLUSION

For the above reasons, it is respectfully requested that the rejections be REVERSED.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon

Harris A. Pitlick
Registration No. 38,779

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 03/06)

NFO:HAP\

CLAIMS APPENDIX

Claim 1: A separator-electrode unit capable of functioning in a lithium battery as a separator-electrode unit, the unit comprising a porous electrode and a separator layer applied to said porous electrode, wherein the separator-electrode unit comprises an inorganic separator layer which comprises at least two fractions of metal oxide particles which differ from each other in their average particle size and/or in the metal, the separator layer comprising metal oxide particles having an average particle size (D_g) which is greater than the average pore size (d) of the pores of the porous electrode that are adhered together by metal oxide particles having an average particle size (D_k) which is smaller than the pores of the porous electrode.

Claim 2: A separator-electrode unit according to claim 1, wherein the separator layer has a thickness (z) which is less than 100 D_g and not less than 1.5 D_g.

Claim 3: A separator-electrode unit according to claim 1, wherein the separator layer has a thickness (z) which is less than 20 D_g and not less than 5 D_g.

Claim 4: A separator-electrode unit according to claim 1, wherein the metal oxide particles having an average particle size (D_g) which is greater than the average pore size (d) of the pores of the porous electrode are Al_2O_3 and/or ZrO_2 particles.

Claim 5: A separator-electrode unit according to claim 1, wherein the metal oxide particles having an average particle size (D_k) which is smaller than the average pore size (d) of the pores of the porous electrode are SiO_2 and/or ZrO_2 particles.

Claim 6: A separator-electrode unit according to claim 1, wherein the metal oxide particles having an average particle size (D_g) which is greater than the average pore size (d) of the pores of the porous electrode have an average particle size (D_g) of less than 10 μm.

Claim 7: A separator-electrode unit according to claim 1, wherein the separator layer comprises a coating with shutdown particles which melt at a desired shutdown temperature.

Claim 8: A separator-electrode unit according to claim 7, wherein the shutdown particles have an average particle size (D_w) which is not less than the average pore size (d_s) of the pores of the porous separator layer.

Claim 9: A separator-electrode unit according to claim 7, wherein the shutdown particle layer has a thickness (z_w) which ranges from about equal to the average particle size of the shutdown particles (D_w) up to 10 D_w.

Claim 10: A separator-electrode unit according to claim 1, wherein the separator layer has a porosity of from 30 to 70%.

Claim 11: A separator-electrode unit according to claim 1, wherein the unit is bendable down to a radius of 50 cm without damage.

Claim 12: A separator-electrode unit according to claim 1, wherein the electrode is an electrode which is capable of functioning as a positive electrode (cathode) or as a negative electrode (anode).

Claim 30: A lithium battery comprising said separator-electrode unit according to claim 1.

Claim 31: A method for making a lithium battery, said method comprising:

incorporating said separator-electrode unit according to claim 1 in a battery comprising lithium to obtain said lithium battery.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.